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I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

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Dated 26 JUL 2000

Patents
Form 1/77

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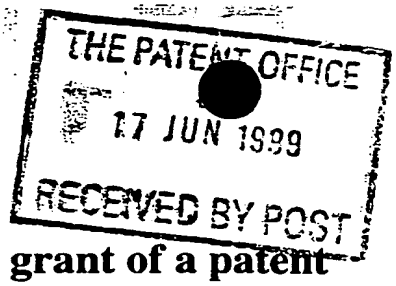

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17JUN99 E455073-3 C06256
P01/7700 0.00 - 9913990.9

Request for grant of a patent

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17 JUN 1999

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference — **P/61815**

2. Patent application number
(The Patent Office will fill in this part) — **9913990.9**

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*
Patents ADP number *(if you know it)*
If the applicant is a corporate body, give the country/state of its incorporation

MARCONI COMMUNICATIONS LIMITED
P O BOX 53, NEW CENTURY PARK
COVENTRY CV3 1HJ

ENGLAND

75192000 1mb

4. Title of the invention

MESH NETWORKS

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent

(including the postcode)
Patents ADP number *(if you know it)*

H A BRANFIELD

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Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

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a) any applicant named in part 3 is not an inventor, or
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Description	3
Claim(s)	2
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9 06

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Priority documents	-
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Request for preliminary examination and search (Patents Form 9/77)	1
Request for substantive examination (Patents Form 10/77)	1
Any other documents (Please specify)	-

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Signature: H A BRANFIELD — Date: 16.6.99

12. Name and daytime telephone number of person to contact in the United Kingdom: H. A. BRANFIELD 01245-275132

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MESH NETWORKS

In networks, such as telecommunication networks, fully meshed networks are often used to interconnect the nodes together and in particular to interconnect trunk exchanges. Although fully meshed networks can be of considerable use, they do have the characteristic that the more nodes there are in a fully meshed network, then the narrower the routes between nodes have to be once the switches are port limited. Doubling the nodes in a fully meshed network can halve the size of each route across the mesh. However, reducing the route size can increase the chance of blocking as well as reducing the Erlang efficiency.

In some telecommunication networks each fully meshed trunk exchange is also connected to several local exchanges, so that the longer distance trunk calls tend to traverse four exchanges namely a local, a trunk, a second trunk and a final local.

In such a network the local exchanges only need to know if a call originating on its own exchange cannot be terminated on its own exchange, in which case the call is forwarded to a trunk exchange.

For reasons of redundancy a local exchange is normally connected to more than one trunk exchange, in which case a call which cannot be terminated on its own exchange can probably be forwarded to any of the connected trunk exchanges.

However if the local exchanges are connected to more trunk exchanges than are needed for redundancy reasons, then the local exchange could be asked to perform part of the overall trunk routing algorithm. Consequently the intended final destination of the call can be used to decide to which trunk exchange the call should be sent to by the local exchange.

Provided the local exchange is able to route to more than one trunk exchange depending on the destination of the call, then it is possible to use a pair of trunk exchanges to perform the function of one existing trunk exchange, with approximately twice the capacity and throughput. This is assuming that the two exchanges each have the same or similar capacity to the existing trunk exchange. The existing trunk exchange can be one of the pair of trunk exchanges. The pair of trunk exchanges can be known as Siamese trunk exchanges.

According to the present invention there is provided a telecommunications network comprising a plurality of major nodes, each major node including one or more major switches, at least one of the major nodes including a plurality of major switches, each major node having a connection to each other major node by means of a connection between a major switch at the one major node and a major switch at the other major node and each major node having associated therewith a respective plurality of outer nodes, each major switch of each major node being connected to all of the respective associated plurality of outer nodes and including a network routing algorithm to control the routing in the network

There is further provided a method of upgrading a telecommunications network, said telecommunications network comprising a plurality of major nodes, wherein each major node includes at least one major switch, each major node having a direct connection to each other

major node by means of a connection between a major switch at the one major node and a major switch at the other major node and the major switch or switches of each major node being each connected to all of a respective plurality of multiple outer nodes, the method comprising the steps of :-

(a) adding a further major switch to at least one of the major nodes;

(b) connecting all of the respective plurality of outer nodes to the further major switch;

(c) providing a network routing algorithm to control the routing in the network; and

(d) dividing the connections from the at least one major node to the major switches of the other major nodes between the major switch or major switches and the further major switch of the at least one major node.

The present invention will now be described by way of example, with reference to the accompanying drawings in which:

Figure 1 shows an example of a network having a number of fully meshed major nodes;

Figure 2 shows an example of a fully meshed major node of the network shown in Figure 1 connected to multiple outer nodes;

Figure 3 shows an example of a fully meshed major node of the network shown in Figure 1 with a single major switch;

Figure 4 shows an example of a fully meshed major node of the network shown in Figure 1 with two unconnected major switches;

Figure 5 shows an example of a fully meshed major node of the network shown in Figure 1 with two connected (Siamesed) major switches; and

Figure 6 shows an example of a network as shown in Figure 1 including a number of fully meshed major nodes where each node has two major switches.

Figure 1 shows an example of a network having fully meshed major nodes, such as trunk exchanges, with a direct link between every pair of major nodes. In practice these links are often carried by transmission systems.

In Figure 2 some of the major nodes (trunk exchanges) of Figure 1 are shown connected to multiple outer nodes, such as local exchanges. In practice these connections are often carried by transmission systems. The connection of multiple locals to trunk exchanges is a recognised telecommunication network configuration.

Figure 3 shows a major node of Figure 2 containing a single major switch. Such a major switch could be a trunk exchange equipment. This major switch is connected to all the other major Nodes as well as all the illustrated multiple Outer Nodes. The illustrated Outer Nodes may also be connected to major switches at other major nodes.

Figure 4 shows the major node of Figure 3, to which has been added a further major switch. Any added major switches could be trunk exchanges. The direct links from the other major nodes are taken to one or the other, but not both, of the major switches. The pair of major switches are both connected to all the multiple outer nodes associated with that major node. The outer nodes have to be able to route calls or messages to the appropriate one of the pair of major switches.

loudspeaker system comprising a plurality of distributed mode loudspeakers spaced apart from one another along a principal axis, each distributed mode loudspeaker comprising a panel extending outwards from the principal axis and an exciter mounted on the panel for causing the panel to vibrate and emit sound, wherein the panels spaced along the principal axis define a plurality of slots therebetween.

This arrangement differs from that described in WO98/53638 in two respects. In the present invention, the panels are arranged along an axis and extend outwards from the axis whereas in WO98/53638 the panels are arranged over a sheet or plane and extend along the sheet or plane. Secondly, in the present invention sound emerges from the slots between the panels.

The normal to the plane of the panels can be at an angle of at most 30° from the direction of the principal axis, preferably at most 15°. Accordingly, the panels may extend substantially perpendicularly to the principal axis. A reflector may be provided at one end of the line of panels. The panels can be of different sizes, for example reducing in size along the principal axis. Some or all of the panels may be driven by a plurality of exciters.

The exciters can be driven with varying polarities, which can be selected to provide a desired directionality. Alternatively or additionally, the phase, delay and filtering of the signals provided to the exciters can be

selected to provide a desired directionality.

For a better understanding of the invention a specific embodiment of it will now be described, purely by way of example, with reference to the accompanying drawing which shows a loudspeaker array according to the invention.

The loudspeaker system comprises a stack of distributed mode loudspeakers 1 spaced apart from one another along a principal axis 13.

Each of a plurality of distributed mode loudspeakers 1 comprises a flat panel 3 extending in a plane perpendicular to the principal axis 13 and an exciter 5 mounted on the flat panel and coupled to it. The panels 3 define a slot 11 between each pair of adjacent panels. The exciters 5 are coupled to electrical connectors 7 for connection to electrical driving apparatus.

In the described embodiment, a reflector 9 is provided at one end of the stack, the reflector end. The panels 3 are not all the same size; the largest panel is adjacent to the reflector and the linear size of the panels 3 decreases exponentially along the principal axis. These arrangements are intended to be suitable for sound output principally along the principal axis, emerging from the stack at the opposite end to the reflector end.

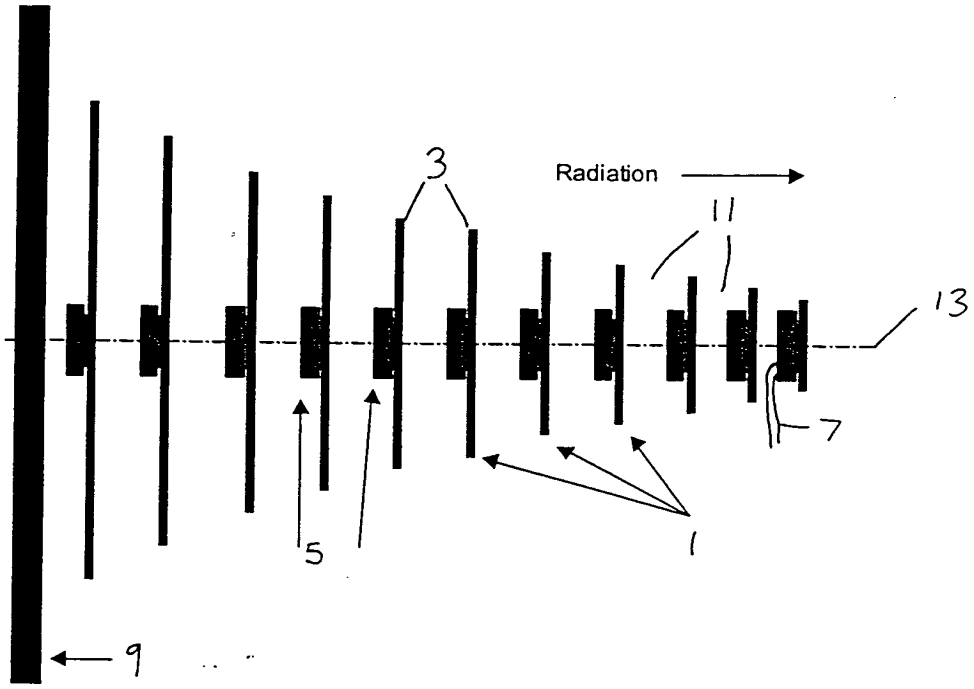
Sound radiation emerges from the slots 11 defined by the panels 3, which act as ducts.

The directivity of the sound output can be varied by controlling the signals supplied to each of the exciters

5. The easiest way is to vary the polarity of the signals supplied to each exciter. For greater control, the phase of the signal supplied to each exciter can be controlled, a delay can be introduced and frequency filtering can be applied. The reflector also influences directivity.

The stack can be considered to be an inverse horn; radiation is emitted preferentially from the narrow end of the stack.

The device is compact and can produce a high power. The use of multiple exciters and panels helps prevent structural overloading of the loudspeakers and also reduces effects caused by the compliance of the air. Distortion is reduced, since there are no high pressure points in the air. The directivity of the device can be controllable over a wide bandwidth.


3
Radiation
11
13
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1
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